URLs

CHROMOSOME BIOLOGY

Meiotic functions for a histone modification

Genetic analysis of a *Drosophila melanogaster* female sterile mutation has provided some of the first insights into the mechanisms that control the morphological changes that chromosomes undergo during meiosis, and into functional requirements for histone modifications during oogenesis.

Ivanovska *et al.* studied female sterile fly mutants, hoping to learn more about the ill-understood mechanisms that control the architecture of meiotic chromosomes. They found that embryos laid by females that carried one particular mutation — Z3-0437 — showed abnormal chromosome dynamics. It turns out that the mutation maps to the gene *nkh1*, which encodes a kinase that specifically phosphorylates histone H2A. The mutation is probably hypomorphic and results in an amino-acid substitution in the kinase domain.

Detailed analysis revealed that NKH1 is required for several meiosis-specific events; for example, the formation of the karyosome — an oocyte-specific chromosomal structure that forms in prophase I — and of the metaphase I spindle. To dissect the mechanisms behind the mutant phenotype, the authors first looked at homologous recombination in early prophase I. They found that NKH1 is required for the disassembly of the synaptonemal complex (a structure that holds homologous chromosomes together during meiotic recombination), but not for double-strand break repair. Later on, NKH1 is required for the loading of condensin onto the chromosomes, which is required for chromosome condensation and consequent karyosome formation.

In addition, the results indicate a specific role for histone modifications in meiosis. The authors found evidence of a meiotic histone modification cascade — although some modifications are unaffected in *nkh1* mutants, others are absent. It remains to be seen what the function of a meiosis-specific histone modification pathway might be. One possibility is that, consistent with the general role of histone modification, it might control access of key factors to the chromosomes at crucial stages during meiosis.

Magdalena Skipper

References and links

ORIGINAL RESEARCH PAPER
Ivanovska, I. *et al.* A histone code in meiosis: the histone kinase, NHK-1, is required for proper chromosomal architecture in *Drosophila* oocytes. *Genes Dev.* 17 October 2005 (doi:10.1101/gad.1348905)

FURTHER READING Gerton, J. L. & Hawley, R. S. Homologous chromosome interactions in meiosis: diversity amidst conservation. *Nature Rev. Genet.* **6**, 477–487 (2005) | Hagstrom, K. A. & Meyer, B. J. Condensin and cohesin: more than chromosome compactor and glue. *Nature Rev. Genet.* **4**, 520–534 (2003)